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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/510,348

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Masahiko Hashimoto

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10/12/2005

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WASHINGTON, DC 20006-1021

EXAMINER

THOMPSON, JEWEL VERGIE

ART UNIT

PAPER NUMBER

2855

DATE MAILED: 10/12/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/510,348	Applicant(s) HASHIMOTO ET AL.	
	Examiner Jewel V. Thompson	Art Unit 2855	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 30-58 is/are pending in the application.
 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 30-33, 36, 38-46, 48-54 and 56-58 is/are rejected.
- 7) ☒ Claim(s) 34, 35, 37, 47 and 55 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 06 October 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>10/6/04</u> . | 6) <input type="checkbox"/> Other: ____. |

DETAILED ACTION

Information Disclosure Statement

1. Acknowledgement is made of the Information Disclosure Statement filed October 6, 2004, which has been made record of and placed in the file.

Priority

2. Acknowledgement is made of the Priority filed October 6, 2004, which has been made record of and placed in the file.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 30 are rejected under 35 U.S.C. 102(b) as being anticipated by Suzuki et al (6,776,051).

Regarding claims 30-32,36,38-42 and 48-53, Suzuki et al teaches an ultrasonic sensor for performing transmission or reception of an ultrasonic wave to a circumjacent

Art Unit: 2855

space stuffed with a fluid (fig. 1), the sensor comprising: an ultrasonic transducer (1a); and a propagation medium portion that is stuffed in a space between the ultrasonic transducer and the circumjacent space, for forming a propagation path of the ultrasonic wave. (fig. 2, col. 4, lines 64-85 and col. 5, lines 5-9)

Regarding claim 31, Suzuki et al teaches an ultrasonic sensor for performing transmission or reception of an ultrasonic wave to a circumjacent space stuffed with a fluid, the sensor comprising: an ultrasonic transducer; and a propagation medium portion that is arranged between the ultrasonic transducer and the circumjacent space, for forming a propagation path of the ultrasonic wave, wherein a density p , of the propagation medium portion, an acoustic velocity C , in the propagation medium portion, a density of the fluid that stuffs the space, and a sound velocity in the fluid that stuffs the space satisfy a relation expressed as $(p(2))/(p(1)) < (C(1)/C(2)) < 1$. In this case, the propagation medium is a gel and the fluid is a gas (col. 7, lines 10-11). The density of the gas is far less than the density of the gel and then the ration of the sound velocity would hold true, therefore the equation is true.

Regarding claim 32, Suzuki et al teaches The ultrasonic: sensor as claimed in claim 31, wherein the propagation medium portion has a first surface region (5) that faces an ultrasonic vibration surface (fig. 2) of the ultrasonic transducer and a second surface region (3) that faces a flow that stuffs the circumjacent space, and the second surface region of the propagation medium portion is inclined with respect to the first surface region.

Regarding claim 36, Suzuki et al teaches the propagation medium portion is formed of a dry gel of an inorganic oxide or an organic polymer (col. 6, line 57).

Regarding claim 38, Suzuki et al teaches a density of the dry gel is not greater than 500 kg/m³, and a mean pore diameter of the dry gel is not greater than 100 nm (col. 11, lines 10-13).

Regarding claim 39, Suzuki et al teaches an acoustic matching layer that is provided between the ultrasonic transducer and the propagation medium portion, for acoustically matching the ultrasonic transducer with the propagation medium portion (fig. 3)

Regarding claim 40, Suzuki et al teaches the fluid that stuffs the circumjacent space is a gas having a density ρ_2 of not greater than 10 kg/m³ (col. 7, lines 10-11).

Regarding claim 41, Suzuki et al teaches a direction of transmission or reception of an ultrasonic wave is almost parallel to the second surface region (fig. 10 and 3).

Regarding claim 42, Suzuki et al teaches an ultrasonic flowmeter comprising: a flow measurement section having an inner wall that defines a channel of a fluid to be measured (fig. 10); at least one ultrasonic transducer (1a) that is provided outside a channel space enclosed by the inner wall of the flow measurement section, for performing transmission or reception of an ultrasonic wave (fig. 10); and a propagation medium portion that is arranged between the ultrasonic transducer and the channel space, for forming a propagation path of the ultrasonic wave (fig. 3) wherein a density ρ , of the propagation medium portion, an acoustic velocity C , in the propagation medium

Art Unit: 2855

portion, a density of the fluid that stuffs the space, and a sound velocity in the fluid that stuffs the space satisfy a relation expressed as $(\rho(2))/(\rho(1)) < (C(1)/C(2)) < 1$. In this case, the propagation medium is a gel and the fluid is a gas (col. 7, lines 10-11). The density of the gas is far less than the density of the gel and then the ration of the sound velocity would hold true, therefore the equation is true.

Regarding claim 48, Suzuki et al teach the fluid to be measured is a gas having a density ρ_2 of not greater than 10 kg-m^{-3} (col. 7, lines 10-11).

Regarding claim 49, Suzuki et al teaches the propagation medium portion is formed of a dry gel of an inorganic oxide or an organic polymer (col. 6, line 57).

Regarding claim 50, Suzuki et al teaches a solid frame portion of the dry gel is made hydrophobic (col. 11, line 39)

Regarding claim 51, Suzuki et al teaches a density of the dry gel is not greater than 500 kg/m^3 , and a mean pore diameter of the dry gel is not greater than 100 nm (col. 11, lines 10-13).

Regarding claim 52, Suzuki et al teaches a matching layer (3) that is provided between the ultrasonic transducer and the propagation medium portion, for acoustically matching the ultrasonic transducer with the propagation medium portion (fig. 3).

Regarding claim 53, Suzuki et al teaches a size of a channel space in the flow measurement section, the size being measured in a direction perpendicular to a direction of flow velocity of the fluid to be measured, is not greater than a half wavelength of the ultrasonic wave at a center frequency in the fluid to be measured (fig. 10).

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 33 is rejected under 35 U.S.C. 103(a) as being unpatentable over Suzuki et al in view of Lynnworth (4,336,719).

Regarding claim 33, Suzuki et al teaches an ultrasonic sensor for performing transmission or reception of an ultrasonic wave to a circumjacent space stuffed with a fluid, the sensor comprising: an ultrasonic transducer; a propagation medium portion that is arranged between the ultrasonic transducer and the circumjacent space, for forming a propagation path of the ultrasonic wave wherein a density $\rho(1)$ of the propagation medium portion, an acoustic velocity C , in the propagation medium portion, a density $\rho(2)$ of the fluid that stuffs the space, and a sound velocity $C(2)$ in the fluid that stuffs the space satisfy a relation expressed as $(\rho(2)/\rho(1)) < (C(1)/C(2)) < 1$. Suzuki et al fails to teach a reflector that is arranged in contact with the propagation medium portion, for controlling the propagation path of the ultrasonic wave. Lynnworth teaches an ultrasonic flow meter comprising reflectors (171a and 171b). It would have been obvious to one of ordinary skill in the art at the time that the invention was made to have used the reflectors of Lynnworth in the apparatus of Suzuki et al for the purpose of

enhancing the propagation in the path between the reflectors and to control the main lobe of the reflected beam (Lynnworth, col. 20, lines 30-34)

5. Claim 43 is rejected under 35 U.S.C. 103(a) as being unpatentable over Suzuki et al in view of Khuri-Yakub et al (6,854,338)

Regarding claim 43, Suzuki et al fails to teach a plurality of ultrasonic transducers are provided, a first ultrasonic transducer among the plurality of ultrasonic transducers is arranged so as to emit an ultrasonic wave to a second ultrasonic transducer of the plurality of ultrasonic transducers, and the second ultrasonic transducer is arranged so as to emit an ultrasonic wave to the first ultrasonic transducer. Khuri-Yakub et al teaches a plurality of transducers (col. 7, lines 41-44) It would have been obvious to one of ordinary skill in the art at the time that the invention was made to have used the plurality of transducers of Khuri-Yakub et al in the apparatus of Suzuki et al for the purpose of measuring the pressure drop along the channel (Khuri-Yakub et al, col. 7, lines 41-44)

6. Claims 44, 46, 56 and 58 are rejected under 35 U.S.C. 103(a) as being unpatentable over Suzuki et al in view of Lynnworth (5,437,194)

Regarding claims 44 and 45, Suzuki et al teaches the propagation medium portion has a first surface region that faces an ultrasonic vibration surface of the ultrasonic transducer and a second surface region that faces the channel space (fig. 3).

Suzuki et al fails to teach the second surface region of the propagation medium portion is inclined with respect to the first surface region. Lynnworth et al teaches in col. 3, lines 23-24 slant and offset mounting geometries of transducers. It would have been obvious to one of ordinary skill in the art at the time that the invention was made to have used the inclined transducer of Lynnworth in the apparatus of Suzuki et al for the purpose of measuring low flowing fluid (Lynnworth, fig. 10)

Regarding claim 46, Suzuki et al teaches 46 the second surface region of the propagation medium portion forms substantially no difference in level between the second surface region and the inner wall of the flow measurement section (fig. 10 and 3).

Regarding claims 56 and 58, Suzuki et al teaches a flow measurement section having an inner wall that defines a channel of a gas; a pair of ultrasonic transducers that are provided outside a channel space enclosed by the inner wall of the flow measurement section, for performing transmission or reception of an ultrasonic wave (fig. 10); and a pair of propagation medium portions that are arranged between each of the one pair of ultrasonic transducers and the channel space (fig. 3), for refracting a propagation path of the ultrasonic wave, the propagation medium portion comprising a first surface region that faces an ultrasonic vibration surface of the ultrasonic transducer and a second surface region that faces the channel space (fig. 3). Suzuki et al fails to teach the first surface region of the propagation medium portion being inclined in a direction of flow velocity of the gas in the channel space, and the second surface region being almost parallel to the direction of flow velocity of the gas in the

Art Unit: 2855

channel space. Lynnworth et al teaches in col. 3, lines 23-24 slant and offset mounting geometries of transducers. It would have been obvious to one of ordinary skill in the art at the time that the invention was made to have used the inclined transducer of Lynnworth in the apparatus of Suzuki et al for the purpose of measuring low flowing fluid (Lynnworth, fig. 10)

7. Claim 54 is rejected under 35 U.S.C. 103(a) as being unpatentable over Suzuki et al in view of Miwa et al (4,552,021).

Regarding claim 54, Suzuki et al fails to teach the ultrasonic transducer forms a convergence sound field. Miwa et al teaches the transducer has a maximum intensity of the sound field, fig. 10. It would have been obvious to one of ordinary skill in the art at the time that the invention was made to have the transducer of Miwa et al in the apparatus of Suzuki et al for the purpose of eliminating the surface reflection of the transducer.

8. Claim 57 is rejected under 35 U.S.C. 103(a) as being unpatentable over Suzuki et al in view of Gomm et al (6,634,239)

Regarding claim 57, Suzuki et al teaches a pipe for supplying a fluid to be measured to the ultrasonic flowmeter. Suzuki et al fails to teach a display section for displaying a flow rate measured by the ultrasonic flowmeter. Gomm et al teaches digital readout (70). It would have been obvious to one of ordinary skill in the art at the time

Art Unit: 2855

that the invention was made to have used the digital display of Gomm et al for the purpose of displaying a frequency of the total cycling time of the inventive system (col. 5, lines 26-28)

Allowable Subject Matter

9. Claims 34, 35, 37, 47 and 55 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jewel V. Thompson whose telephone number is 571-272-2189. The examiner can normally be reached on 7-4:30, off alternate Mondays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward Lefkowitz can be reached on 571-272-2180. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

A handwritten signature in cursive script that reads "Jewel V. Thompson". The signature is written in black ink and is positioned above the printed name and date.

Jvt

October 7, 2005